MISSION OPERATIONS AND DATA SYSTEMS DIRECTORATE

Earth Science Data and Information System (ESDIS) Project

Resource Allocation Tool (RAT) Users Manual

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Space Administration

Goddard Space Flight Center
Greenbelt, Maryland

Preface

This document provides the Earth Science Data and Information System (ESDIS) Resource Allocation Tool (RAT) user procedures.

Questions concerning this document should be addressed to:

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Abstract

This document provides the ESDIS RAT user procedures.

This document also describes the ESDIS RAT system architecture and operational concept.

Keywords: *ESDIS, Earth Science Data and Information System; EOSDIS, EOS Data and Information System; RAT, Resource Allocation Chart*

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Section 1. Introduction

1.1 Background

The Earth Sciences Data and Information Systems (ESDIS) Project Office at NASA's Goddard Space Flight Center (GSFC), Code 505, has overall responsibility for the design and development of the Earth Observing System (EOS) Data and Information System (EOSDIS). The ESDIS Project Office has established, among others, a Science Office for coordinating the science requirements into Distributed Active Archive Centers (DAACs); a Development office for developing and implementing EOSDIS; and a Systems Management Office (SMO) for systems engineering, integration, test, and verification of EOSDIS and the EOS Ground System (EGS). The EGS is EOSDIS plus NASA-funded interfaces to EOSDIS, including the in-place NASA infrastructure that is being augmented to support the NASA Mission to Planet Earth (MTPE) initiative. The EGS includes the hardware and software necessary to support the on-orbit flight operations for each EOS spacecraft plus ground data handling and processing operations for the MTPE instruments from other spacecraft.

The ESDIS System Integration and Test (SI&T) Organization within the ESDIS SMO is responsible for coordinating all test-related activities for the EOSDIS and the emerging EGS. Toward this end, the responsibilities of the SI&T Manager are to

- Review/approve EOSDIS component development testing
- Collaborate with ESDIS development managers on component acceptance testing
- Certify the EOSDIS interfaces
- Plan and execute the EGS integration and test program
- Support independent EGS system certification
- Facilitate science software integration
- Coordinate prelaunch spacecraft compatibility tests
- Assist in the transition to operations

The ESDIS Resource Allocation Tool (RAT) is a planning and analysis tool that assists the SI&T Manager and the ESDIS SI&T Staff in

(1) Planning the EGS integration and test program

(2) Coordinating the utilization of EOSDIS systems during various testing phases

(3) Analyzing the use of EOSDIS system components during testing

(4) Making best use of custom test equipment (e.g., EOSDIS Test System [ETS]).

1.2 Purpose

The purpose of this document is to provide the user with sufficient procedural information to permit efficient use of the ESDIS RAT.

1.3 Scope

This document provides the required user procedures to generate an ESDIS RAT project, define project parameters, and develop required output. A top-level project flow has been added to aid the reader's understanding of the process involved in organizing a ESDIS RAT project and generating resource analysis products.

The system description is provided to permit user understanding of the ESDIS RAT architecture and major components.

1.4 Document Organization

Following this introduction, Section 2 provides an ESDIS RAT system overview. Section 3 provides the ESDIS RAT user procedures. A list of abbreviations and acronyms is provided at the end of the document.

1.5 Information Format

In Section 3, the required actions of the ESDIS RAT Operator have been placed in bold text to permit easy use of these procedures. The major ESDIS RAT components/windows have likewise been identified in bold text to provide easy identification of system features.

Section 2. System Overview

2.1 Overview

The ESDIS RAT is a NASA custom software application that runs on a Macintosh Power Personal Computer (PC). The test planner can quickly generate an ESDIS RAT project through a user interface. The products provided by the ESDIS RAT can be used by both ESDIS management and test planning personnel to support test planning or schedule risk assessment.

The ESDIS RAT permits test planners to effectively schedule vital test resources. These resources can either be EOSDIS system components (e.g., DAACs) or key test equipment (e.g., ETS). A series of these components can be evaluated within one project. Grouping components with like functions or utilization patterns can permit evaluation of a greater number of resources.

This test planning tool provides visibility into resource utilization. The ability of the ESDIS RAT to quickly identify conflicts is a key capability to ensure efficient test execution. This capability permits the test planner to identify issues very early in the test planning process and generate mitigation solutions.

2.2 System Architecture

The ESDIS RAT was designed using an object-oriented methodology. Table 2-1 shows the specific entities and classes. This methodology was selected to permit the rapid feature enhancements required by the ESDIS RAT task.

Table 2-1. Class Definition

Entity	Classes
Physical Entities	RAT Application RAT Document
Roles	Project Manager Resource Manager Conflict Manager
Events	Preferences Project Activity Resource Conflict
Locations	ø
Organizations	ø
Other Systems	ø

Definitions of the major elements in the table are as follows:

RAT Application: The application program that is used to create new RAT documents or edit existing RAT documents.

RAT Document: The data (e.g., projects, resources, and activities) and preferences associated with a single resource allocation chart.

Project Manager: Controls the creation, destruction, and allocation of projects in the RAT document.

Resource Manager: Controls the creation, destruction, and allocation of resources in the RAT document.

Conflict Manager: Controls the detection and resolution of conflicts between two or more resources and updates the entries in the conflicts list.

Preferences: Retains the printing, plotting, and scheduling preferences selected for a particular RAT document.

Project: Controls the creation and destruction of the activity links connecting the projects and the resources and retains the activity characteristics.

Activity: Maintains a list of the time intervals when the project needs the associated resource and retains the activity characteristics.

Resource: Maintains a list of equipment strings associated with the resource and retains the resource characteristics.

Conflict: Maintains a list of all the conflicting activities, the time associated with each conflict, and the conflict characteristics.

Figure 2-1 shows the ESDIS RAT system architecture, which provides the interrelationships of the entities and classes. This logical object layout permits straightforward software module interfaces.

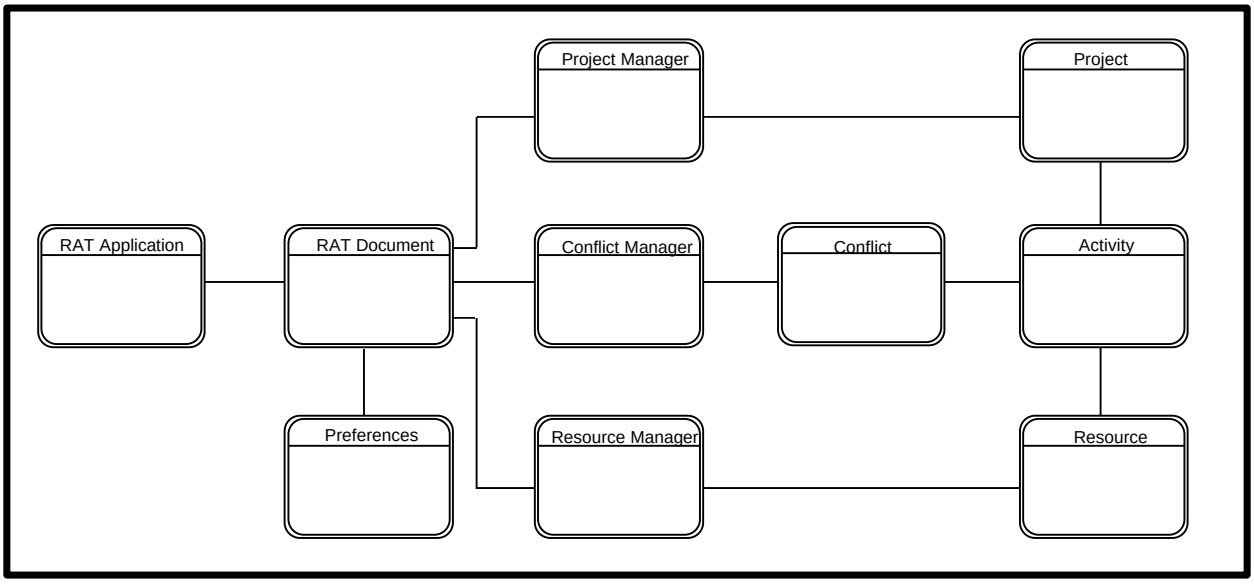

Figure 2-1. ESDIS RAT System Architecture

2.3 System Operational Concept

The ESDIS RAT operational concept is based on key, two-way communications between the test community and the ESDIS RAT Operator. Figure 2-2 is an overview of the life-cycle flow. The major phases of the operational concept are

1. Generation of test resource requests
2. Data input of completed requests
3. Online resource allocation analysis
4. RAT product output

The following paragraphs give a brief description of each phase.

ESDIS RAT input is provided by the test community (e.g., EOSDIS SI&T). An electronic Test Request Form can be generated and distributed to the test community to ensure the receipt of timely and consistent input.

The ESDIS RAT Operator inserts the Test Request Form information into the ESDIS RAT project. The operator places this information into the application through user procedures addressed in sections 3.2.2, 3.2.3, and 3.2.4.

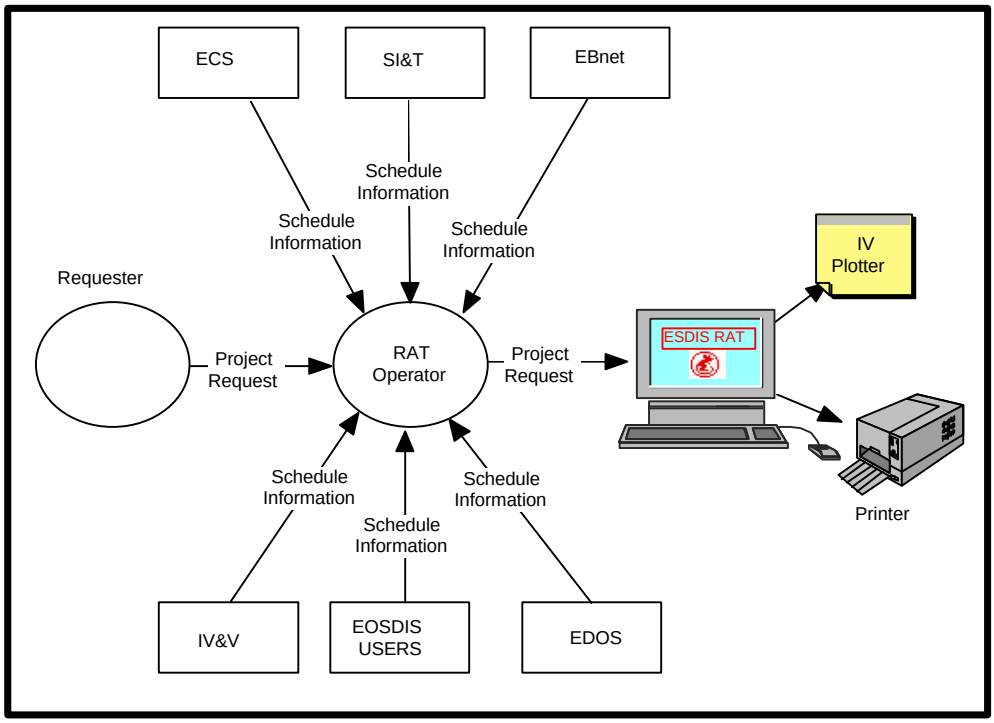

Figure 2-2. ESDIS RAT Operation Concept Overview

Online analysis can be conducted through the evaluation of information contained on the workstation monitor. A color monitor is required to ensure the best opportunity to identify

conflicts. These areas are be shaded in red. The ESDIS RAT Operator can readily determine which resources are in conflict, the duration of the conflict, and the conflict timeframe.

Capabilities exist in ESDIS RAT to obtain output from either a printer or plotter. The printer can be used to output an ESDIS RAT text file showing all project resources. The other output is to a plotter using E-size paper. This output is a graphical representation.

Section 3. User Procedures

3.1 Top-Level Project Flow

The ESDIS RAT project flow can be divided into four logical groups, as Figure 3-1 shows. Each phase contains two steps. Some steps are optional in that they are not required to perform the basic ESDIS RAT resources analysis function.

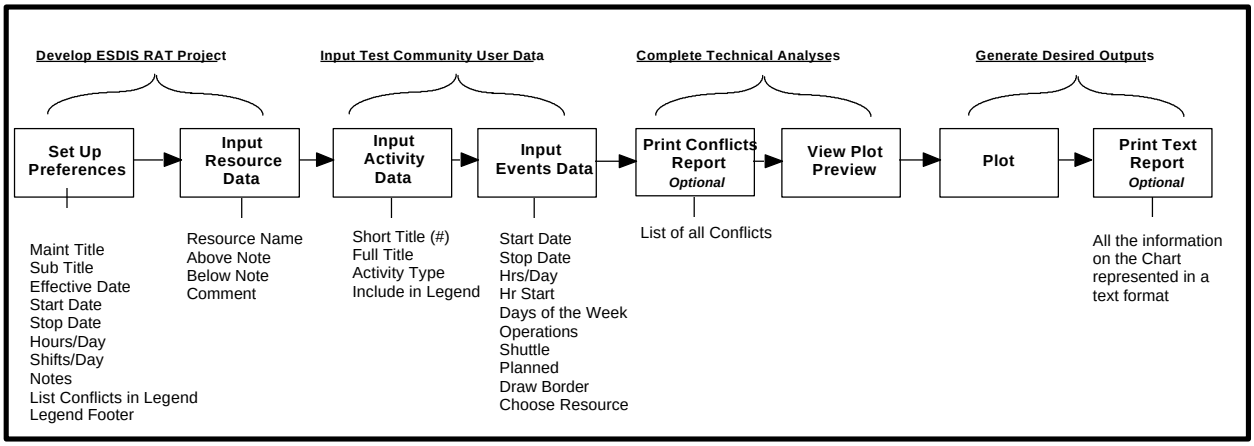

Figure 3-1. ESDIS RAT Life-Cycle Project Flow

The first two steps involve the creation of the project. Significant up-front work is required to determine the overall project schema to be used in developing project templates. Discussions with various technical and management personnel can provide the insight needed to ensure the proper types and level of data desired.

The data input can be performed once the ESDIS RAT project is established. Inputs from the test community are inserted periodically to permit updates to test plans and scheduled activities.

The ESDIS RAT permits online, real-time analysis. A view of a specific ESDIS resource situation is possible by selecting a desired set of calendar parameters. The conflicts are evident through the use of the red shading. Additional conflict information can be obtained by evaluating the information in the legend.

The ESDIS RAT output mechanisms provide the capability to plot an E-size chart or save the information to a text file. These output capabilities permit several different presentation opportunities.

3.2 Detailed User Procedures

The ESDIS RAT interface is very simple to use. A logical set of windows permit the ESDIS RAT Operator to

- Generate a project
- Develop the resource and event templates
- Insert test planning updates
- Generate complete text and graphical products

The major user procedures are presented in an ordered project flow sequence.

3.2.1 Resource Allocation Tool Project Creation

A new project is established by performing several standard file operations. These steps include finding the application, NeoRATPCC 1.1, and opening using the file by using a standard mouse command. The specific steps are provided below:

3.2.1.1 Establishing the Project Document

1. Locate ESDIS RAT Folder using the FIND command if necessary.
2. Open the application by using the mouse to double-click on the NeoRATPCC 1.1 application (shown by the icon). Figure 3-2 provides a sample illustration of the application icon and an ESDIS RAT folder setup.
3. When a FILE NEW operation is performed, a new ESDIS RAT project is generated.
4. At the completion of the project creation phase, perform a FILE SAVE. It is recommended to provide a file name that permits easy project identification. The cheese icon shown in Figure 3-2 was specific to the author's workstation. It may not be available on another workstation. Normally, upon completion of a FILE SAVE, the ESDIS RAT Operator receives the standard DOCUMENT icon represented by the "April Draft T/R" document. After completing the initial FILE SAVE, the project can be initiated by using a FILE OPEN option while in the FINDER mode.

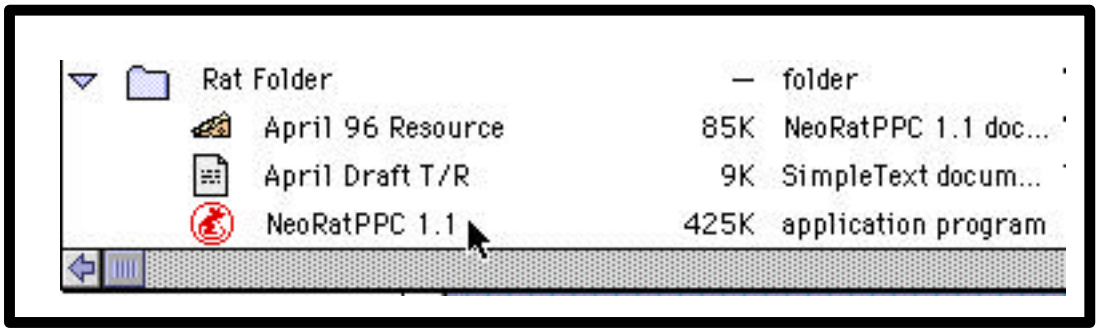

Figure 3-2. ESDIS RAT Folder Example

3.2.1.2 Establishing Preferences

The Rat Preferences screen allows the user to set up the parameters of the RAT.

(1) From the Edit Option in the ESDIS Main Menu Window (shown in Figure 3-3), select Preferences as shown in Figure 3-4. The RAT Preferences Window appears.

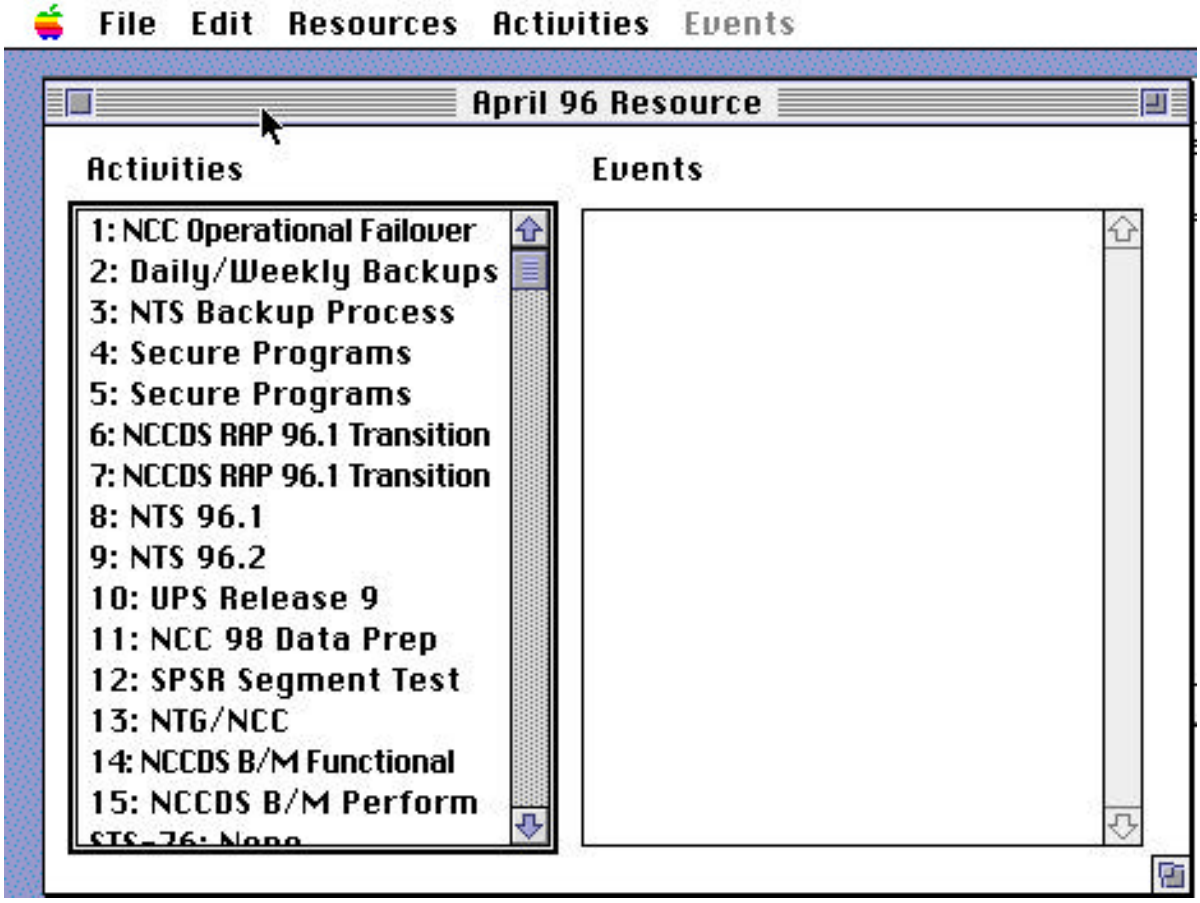

Figure 3-3. ESDIS RAT Main Menu Window

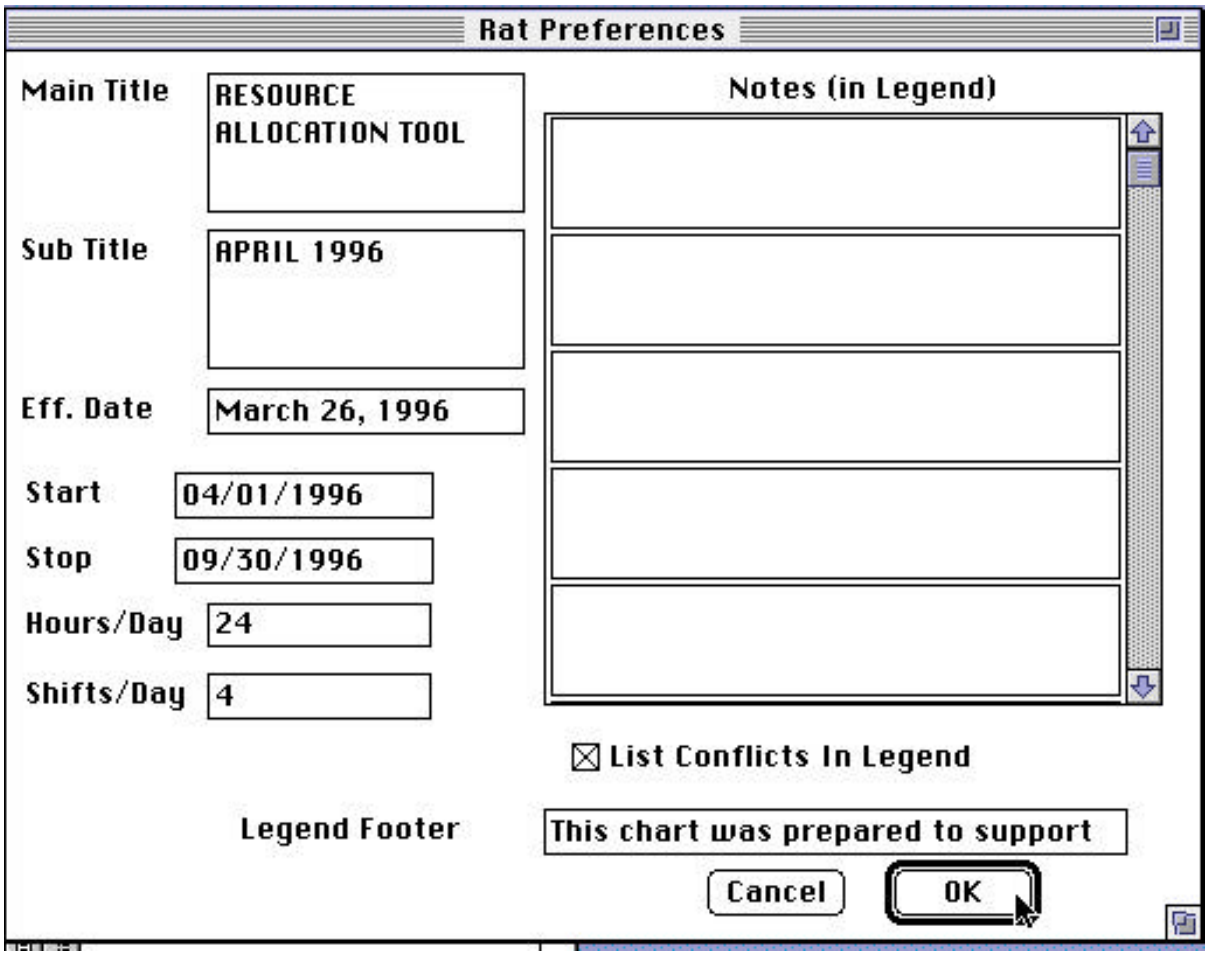

Figure 3-4. ESDIS RAT Preferences Menu Window

(2) In the RAT Preferences Window (shown in Figure 3-4), the ESDIS RAT Operator must enter the following information to ensure that the proper ESDIS RAT output data is displayed:

- Main Title—Title appears at the top of the chart
- Eff. Date—Effective date
- Start—Date the chart begins
- Stop—Date the chart stops
- Hours/Day—The number of hours per day
- Shifts/Day—The number of shifts per day
- Notes—Notes that appear in the bottom of the legend

- List Conflicts In Legend—X indicates that conflicts are listed in text format in the legend
- Legend Footer—Information that appears below the legend

3.2.2 Create/Edit Resources

The following procedures permit the ESDIS RAT Operator to create and edit the ESDIS RAT Resources.

(1) Under the **Resources Menu** of the **ESDIS RAT Main Menu** (shown in Figure 3-3), choose the **Resource Manager** option. The **Resource Manager Window** (shown in Figure 3-5) appears. The following options can be selected in this window, depending on the operation the ESDIS RAT Operator desires to perform:
   - Choose **Create** to add resources.
   - Choose **Edit** to change existing resources.
   - Choose **Delete** to remove resources.

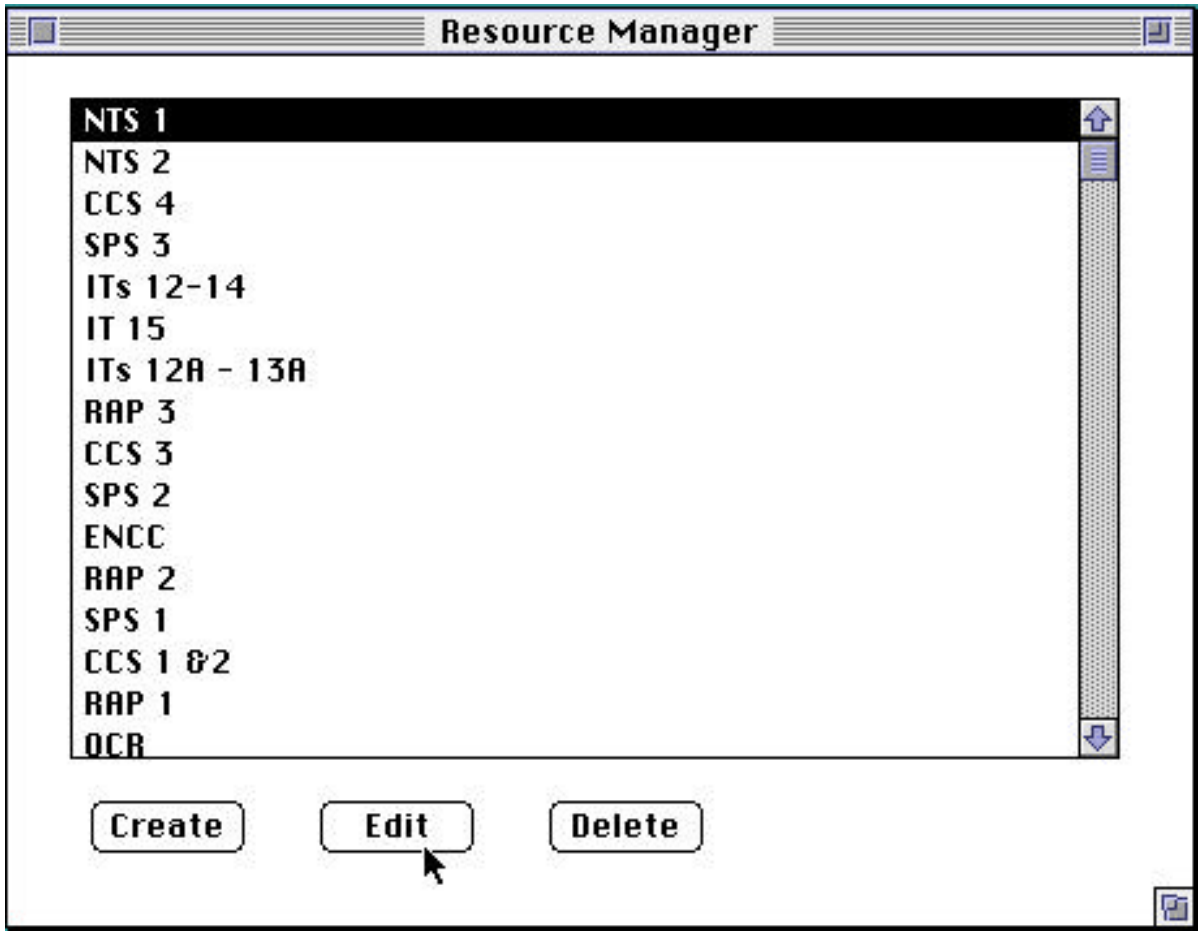

Figure 3-5. ESDIS RAT Resource Manager Window

(2) When all Resources have been created/edited, **click** the box in the upper left corner to exit from this screen.

(3) The **Resource Window** (shown in Figure 3-6) appears if the **Create** or **Edi**t Option is selected. In the **Resource Window**, the ESDIS RAT Operator then enters the following information according to the specific project needs:

- **Resource Name** - Name of resource that appears in the resource column.
- **Above Note** - Information appearing above the resource name.
- **Below Note** - Information appearing below the resource name.
- **Comment** - Additional information that does not appear on the chart.

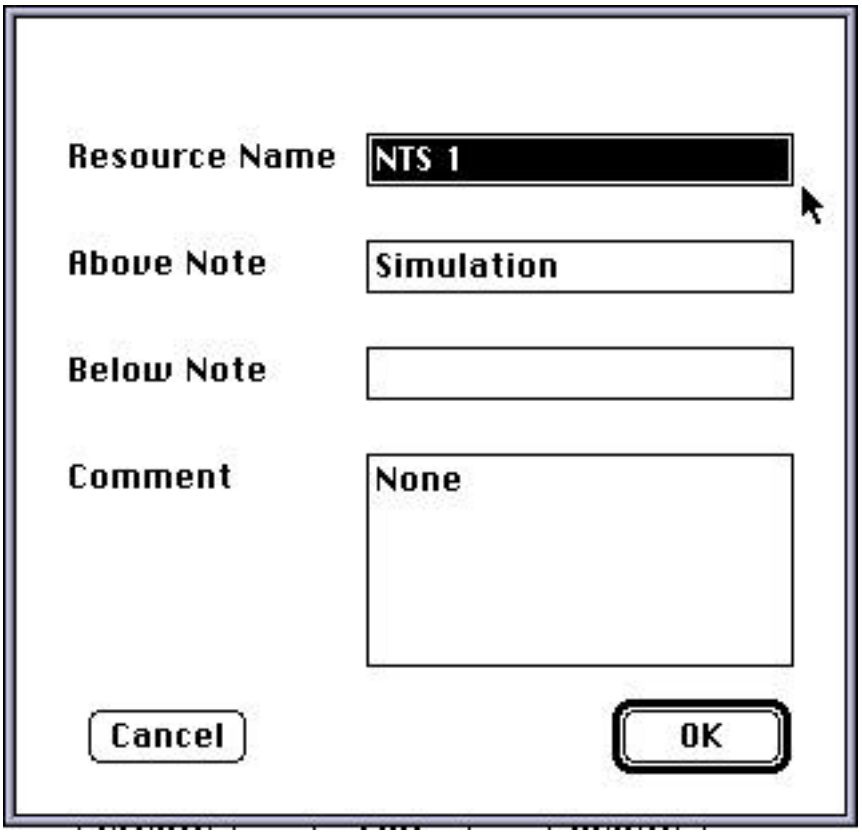

Figure 3-6. ESDIS RAT Resource Window

(4) The ESDIS RAT Operator **clicks** on **OK** when the information has been entered.

(5) The ESDIS RAT Operator leaves the Resource Manager, using the procedure addressed in Step 2 above.

3.2.3 Create/Edit an Activity

Activities are the titles that correspond to the numbers in each event. The events are the boxes that appear on the chart. The following procedures assist the ESDIS RAT Operator to create and edit an ESDIS RAT Activity.

(1) To create/edit Activities or Events, the ESDIS RAT Operator performs the required step while in the **ESDIS RAT Main Menu Window** (see Figure 3-7). The ESDIS RAT Operator can

- **Create** an Activity by selecting the **Create** Option in the **Activities Menu** option**.**
- **Edit** an Activity by **double-clicking** on the chosen activity or by selecting the activity and choosing **Edit** in the **Activities Menu** option.

(2) The **Activity Data Window** appears to permit the ESDIS RAT Operator to enter in specific information. Step 3 provides the procedure for using the **Activity Data Window**.

(3) The ESDIS RAT Operator has the capability to enter the following activity data in the **Activity Data Window** (shown in Figure 3-8):

- **Short Title—**Assign a number to the activity. This number identifies the activity in the Legend and also appears in the event.
- **Full Title—**The title appearing in the legend.
- **Activity Type—**Description of the activity.
- **Include in Legend—**Remove the X for no information to appear in the Legend.

(4) The ESDIS RAT Operator **clicks** on **OK** when the information has been entered.

3.2.4 Create/Edit an Event

Activities are the titles that correspond to the numbers in each event. The events are the boxes that appear on the chart. This section provides the procedures to create and edit an event.

The following steps permit the ESDIS RAT Operator to create and edit events:

(1) The ESDIS RAT Operator proceeds to the **ESDIS RAT Main Menu Window** to create/edit an event. Place the arrow in the **Events box** and **click once.** Figure 3-9 provides a view of the **ESDIS RAT Main Menu Window.**

(2) **The Events Menu** of the **ESDIS RAT Main Menu Window** is now available with all events shown for that activity. This step is shown in Figure 3-9. (Note: the activity must be established first.)

(3) To create/edit an event, the ESDIS RAT Operator performs the required step while in the **ESDIS RAT Main Menu Window** (see Figure 3-9):

To **Create** an event:

- Click **once** on an **Activity** and click **once** in the **Event box;** then select **Create** from the Events Menu.

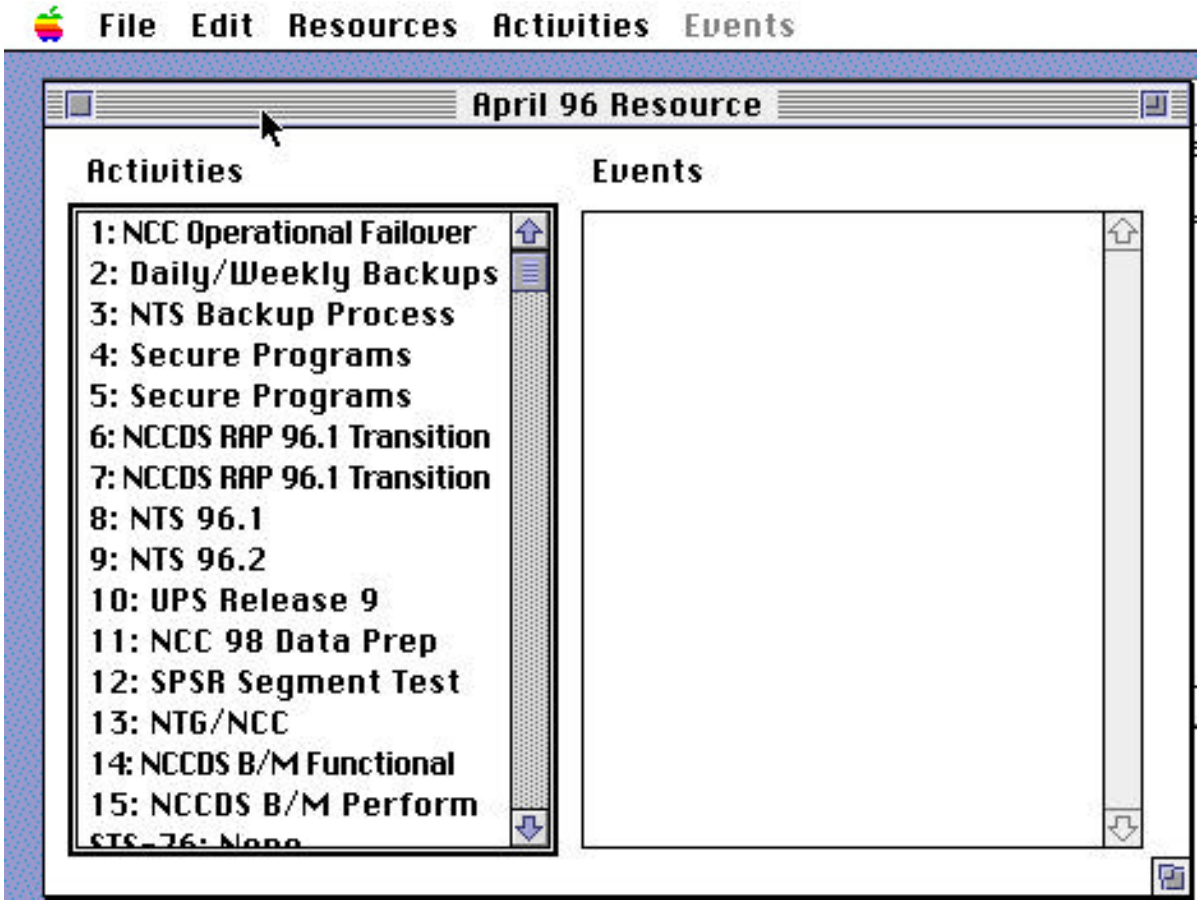

Figure 3-7. ESDIS RAT Main Menu Window

To **Edit** an Event:

- Double click on the Event name.

(4) The **Events Window**, shown in Figure 3-10 appears.

(5) The ESDIS RAT Operator can now **Create**/**Edit** the event. The fields with corresponding definitions are provided below:

- **Start**—The date the event begins.
- **Stop**—The date the event ends.
- **Hrs/Day**—Hours per day the event takes place.
- **Hr Start**—The hour the event begins. This determines which shift the event occurs.
- **Days of the Week**—Place an X in any day the event should occur or use the short-cut buttons provided.
- **Operations**—Place an X if the event should appear as Operations—gray hash marks.

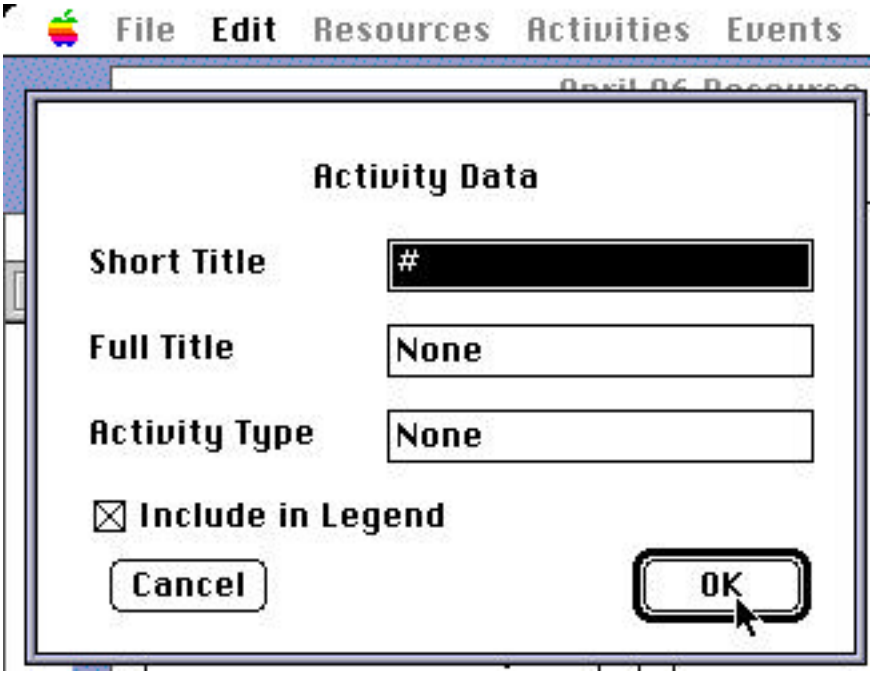

Figure 3-8. ESDIS RAT Activity Data Window

- **Planned**—Place an X if the event appears as a planned activity—green border, blue box.
- **Draw Border**—An X indicates that a border should be drawn.

(**NOTE:** If no X is placed in Operations or Planned, the default is **Estimated**—green border, yellow box. Events scheduled during the same time frame appear as a **Conflict**—appropriate border, solid red box.)

(6) To specify the resources each event utilizes, the ESDIS RAT Operator performs one of the following, depending on the number of resources desired:
   - For one **Resource**: The ESDIS RAT Operator **clicks** once on the Resource name.
   - For more than one **Resource**: The ESDIS RAT Operator holds down the **"Apple Key**" while selecting the desired **Resources.**
- The ESDIS RAT Operator repeats Steps 1 through 4 for each **Event** occurring during an **Activity**.

3.2.5 Create Plot Output

The following procedure permits the generation of the E-size ESDIS RAT Chart.

(1) In the RAT application, select **PLOT** from the **File Menu** while in the **FINDER** mode.
(2) If any conflicts have occurred, a conflicts report is generated. A prompt appears requesting the ESDIS RAT Operator to assign a name to the report and **Save** the file. The ESDIS RAT Operator selects **Cancel** if a text format conflict report is not desired.

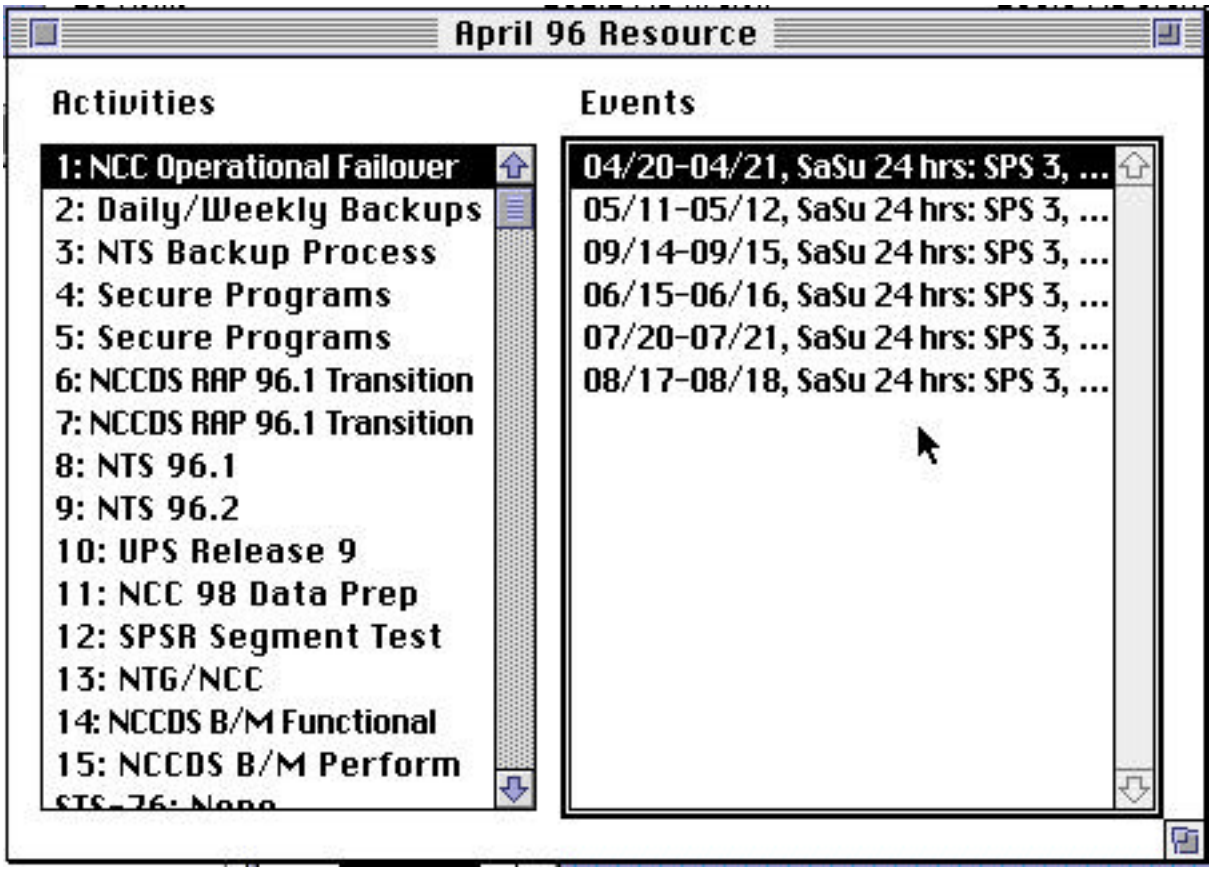

Figure 3-9. ESDIS RAT Main Menu Window

(3) To View:

- Scroll to the portion of the RAT to be viewed (see Figure 3-11 for plot preview).
- Choose **Cancel** when viewing is complete.

(4) To **Print:**

- Make sure the setup is correct.
- From the **File Menu,** select **PLOT.**

Select **PLOT** on the RAT.

Figure 3-10. ESDIS RAT Event Window

3.2.6 Create Text Report Output

The ESDIS RAT has the capability to generate text reports to permit offline test planning analysis. The following procedures permit the generation of the text report.

(1) While in the Finder Mode, the ESDIS RAT Operator selects the **Text Report** from the **File Menu**.

(2) The ESDIS RAT Operator **types** in a desired file name and performs a **Save** operation, as shown in Figure 3-12. A text report is saved to the appropriate place on the ESDIS RAT Operator's workstation hard drive or floppy disk.

Figure 3-13 shows a sample text report.

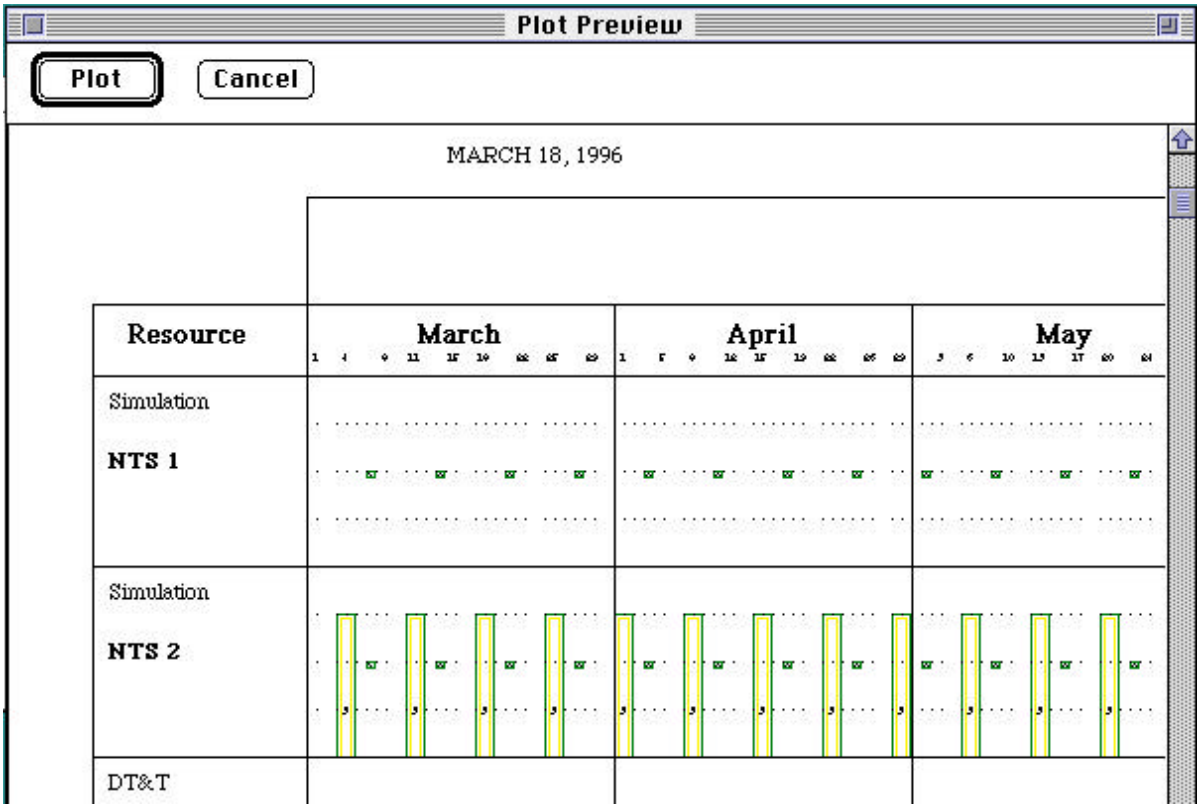

Figure 3-11. ESDIS RAT Plot Preview

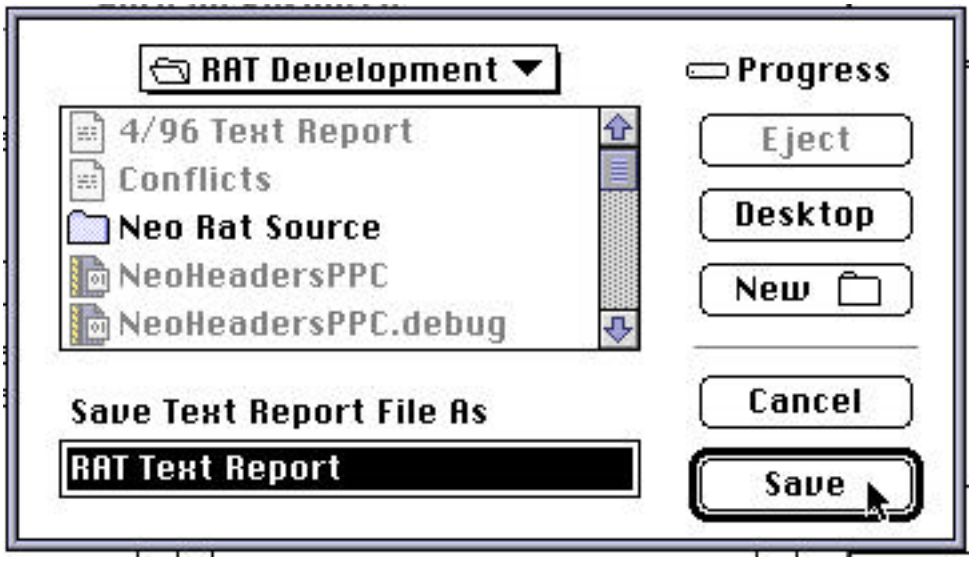

Figure 3-12. ESDIS RAT Text Save Example

April Draft T/R

1: NCC Operational Failover
04/20-04/21, SaSu 24 hrs: SPS 3, RAP 3, CCS 3, ENCC, SPS 1, CCS 1&2, RAP 1, OCR
05/11-05/12, SaSu 24 hrs: SPS 3, RAP 3, CCS 3, ENCC, RAP 2, SPS 1, CCS 1&2, RAP 1, OCR
09/14-09/15, SaSu 24 hrs: SPS 3, RAP 3, CCS 3, ENCC, RAP 2, SPS 1, CCS 1&2, RAP 1, OCR
06/15-06/16, SaSu 24 hrs: SPS 3, RAP 3, CCS 3, ENCC, RAP 2, SPS 1, CCS 1&2, RAP 1, OCR
07/20-07/21, SaSu 24 hrs: SPS 3, RAP 3, CCS 3, ENCC, RAP 2, SPS 1, CCS 1&2, RAP 1, OCR
08/17-08/18, SaSu 24 hrs: SPS 3, RAP 3, CCS 3, ENCC, RAP 2, SPS 1, CCS 1&2, RAP 1, OCR

Figure 3-13 . ESDIS RAT Sample Text Report

Abbreviations and Acronyms

DAAC	Distributed Active Archive Center
EBnet	EOSDIS Backbone Network
ECS	EOSDIS Core System
EDOS	EOS Data and Operations System
EGS	EOS Ground System
EOS	Earth Observing System
EOSDIS	EOS Data and Information System
ESDIS	Earth Science Data and Information System
ETS	EOSDIS Test System
GSFC	Goddard Space Flight Center
IV&V	Independent Verification and Validation
MO&DSD	Mission Operations and Data Systems Directorate
MTPE	Mission to Planet Earth
NASA	National Aeronautics and Space Administration
Nascom	NASA Communications
PC	personal computer
RAT	Resource Allocation Tool
SI&T	System Integration and Test
SMO	Systems Management Office